Stoller
Grand Junction Office established 1959

GJO-2003-513-TAC

299-W18-20 (A5471)
Log Data Report

Borehole Information:

Borehole: 299-W18-20 (A5471)			**Site:** 216-Z-20 Crib		
Coordinates (WA State Plane)		**GWL (ft)[1]:** Dry		**GWL: Date:**	9/17/2003
North	**East**	**Drill Date**	**TOC[2] Elevation**	**Total Depth (ft)**	**Type**
135,081.76 m	566,590.09 m	August 1982	205.338 m	250	Cable Tool
A packer is probably present in the borehole, blocking access to the lower portion of the borehole. This borehole is located in the same area as the carbon tetrachloride extraction groundwater project and may have been modified to support that work.					

Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Welded steel	2.6	8 5/8	8	5/16	+2.6	250
The logging engineer measured the casing stickup using a steel tape. A caliper was used to determine the outside casing diameter. The caliper and inside casing diameter were measured using a steel tape, and measurements were rounded to the nearest 1/16 in. Casing thickness was calculated. Casing bottom is as reported from the well completion summary report (Ledgerwood 1993).						

Borehole Notes:

Borehole coordinates, elevation, and well construction information, as shown in the above tables, are from measurements by Stoller field personnel, Ledgerwood (1993), and HWIS[3]. Zero reference is the top of the 8-in. casing. Grout is present at the ground surface surrounding the borehole casing.

Logging Equipment Information:

Logging System:	Gamma 1E		**Type:** SGLS (70%) 34TP40587A
Calibration Date:	07/2003	**Calibration Reference:**	GJO-2003-468-TAR
		Logging Procedure:	MAC-HGLP 1.6.5, Rev. 0

Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	1	2/Repeat			
Date	09/17/03	09/17/03			
Logging Engineer	Spatz	Spatz			
Start Depth (ft)	125.0	20.0			
Finish Depth (ft)	3.0	7.0			
Count Time (sec)	100	100			
Live/Real	R	R			
Shield (Y/N)	N	N			
MSA Interval (ft)	1.0	1.0			

Log Run	1	2/Repeat			
ft/min	N/A[3]	N/A			
Pre-Verification	AE040CAB	AE040CAB			
Start File	AE040000	AE040123			
Finish File	AE040122	AE040136			
Post-Verification	AE040CAA	AE040CAA			
Depth Return Error (in.)	0	0			
Comments	No fine-gain adjustment.	Repeat section.			

Logging Operation Notes:

Zero reference was top of the 8-in. casing. Logging was performed with a centralizer installed on the sonde. Pre- and post-survey verification measurements for the SGLS employed the Amersham KUT (^{40}K, ^{238}U, and ^{232}Th) verifier with serial number 118. Maximum logging depth achieved was 125 ft.

Analysis Notes:

Analyst:	Sobczyk	Date:	10/20/03	Reference:	GJO-HGLP 1.6.3, Rev. 0

SGLS pre-run and post-run verification spectra were collected at the beginning and end of the day. All of the verification spectra were within the acceptance criteria. The peak counts per second (cps) at the 609-keV, 1461-keV, and 2615-keV photopeaks on the post-run verification spectrum as compared to the pre-run verification spectrum were between 3.6 percent lower and 0.2 percent lower at the end of the day. Examinations of spectra indicate that the detector appears to have functioned normally during logging, and the spectra are accepted.

Log spectra were processed in batch mode using APTEC SUPERVISOR to identify individual energy peaks and determine count rates. The pre-run verification spectrum was used to determine the energy and resolution calibration for processing the data using APTEC SUPERVISOR. Concentrations were calculated in EXCEL (source file: G1EJul03.xls). Zero reference was the top of the 8-in. casing. On the basis of Ledgerwood (1993) and field measurements, the casing configuration was assumed as one string of 8-in. casing with a thickness of 5/16 in. to 125 ft (total logging depth). Dead time and water corrections were not required.

Log Plot Notes:

Separate log plots are provided for gross gamma and dead time, naturally occurring radionuclides (^{40}K, ^{238}U, and ^{232}Th), and man-made radionuclides. Plots of the repeat logs versus the original logs are included. For each radionuclide, the energy value of the spectral peak used for quantification is indicated. Unless otherwise noted, all radionuclides are plotted in picocuries per gram (pCi/g). The open circles indicate the minimum detectable level (MDL) for each radionuclide. Error bars on each plot represent error associated with counting statistics only and do not include errors associated with the inverse efficiency function, dead time correction, or casing correction. These errors are discussed in the calibration report. A combination plot is also included to facilitate correlation. The ^{214}Bi peak at 609 keV was used to determine the naturally occurring ^{238}U concentrations on the combination plot rather than the ^{214}Bi peak at 1764 keV because it exhibited slightly higher net counts per second.

Results and Interpretations:

^{137}Cs was the only man-made radionuclide detected in this borehole. ^{137}Cs was detected at 14, 29, 41, and 45 ft with a concentration near the MDL (0.2 pCi/g). ^{137}Cs was also detected at 13 ft on the repeat log with a concentration near the MDL. After examination of the spectra, it was determined that there is no evidence

of a photopeak at 662 keV at these depths. These reported peaks are probably the result of statistical fluctuation. The RLS log data collected in 1991 by Westinghouse Hanford Co. (WHC) did not indicate the presence of man-made radionuclides. The RLS reached a depth of 233 ft in the borehole.

Increases of 5 pCi/g in apparent ^{40}K concentrations and 0.4 pCi/g in ^{232}Th and ^{238}U concentrations occur at approximately 89 ft, which represents the transition from the coarse-grained sediments of the Hanford H1 to the finer grained sediments of the Hanford H2.

The plots of the repeat logs demonstrate reasonable repeatability of the SGLS data. The natural radionuclides at energy levels of 609, 1461, 1764, and 2614 keV are comparable between the repeat and original SGLS log runs. The trace amounts of ^{137}Cs detected at 14 and 13 ft did not repeat.

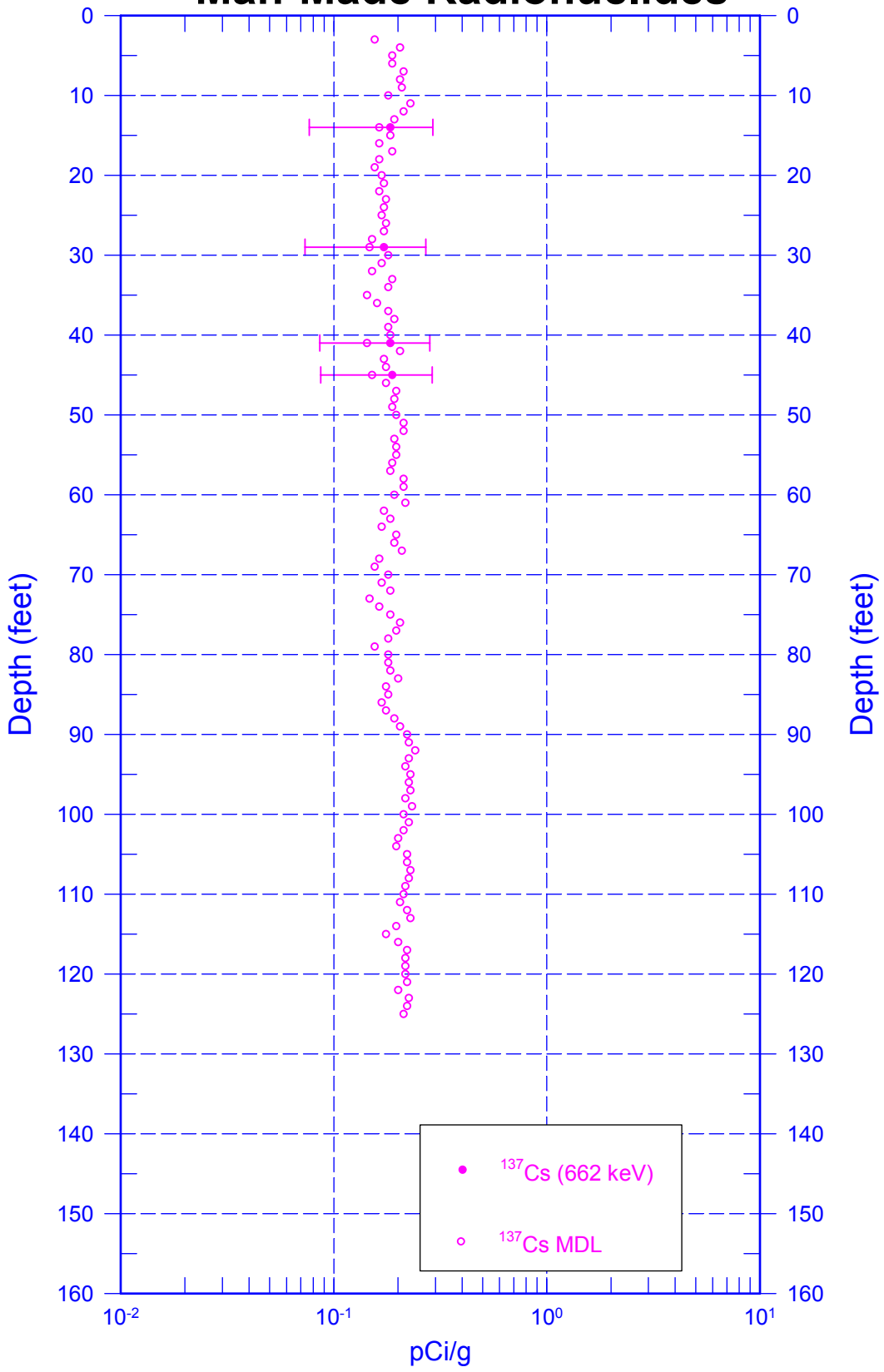
References:

Ledgerwood, R.K., 1993. *Summaries of Well Construction Data and Field Observations for Existing 200-West Resource Protection Wells*, WHC-SD-ER-TI-005, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

---

[1] GWL – groundwater level
[2] TOC – top of casing
[3] HWIS – Hanford Well Information System
[4] N/A – not applicable

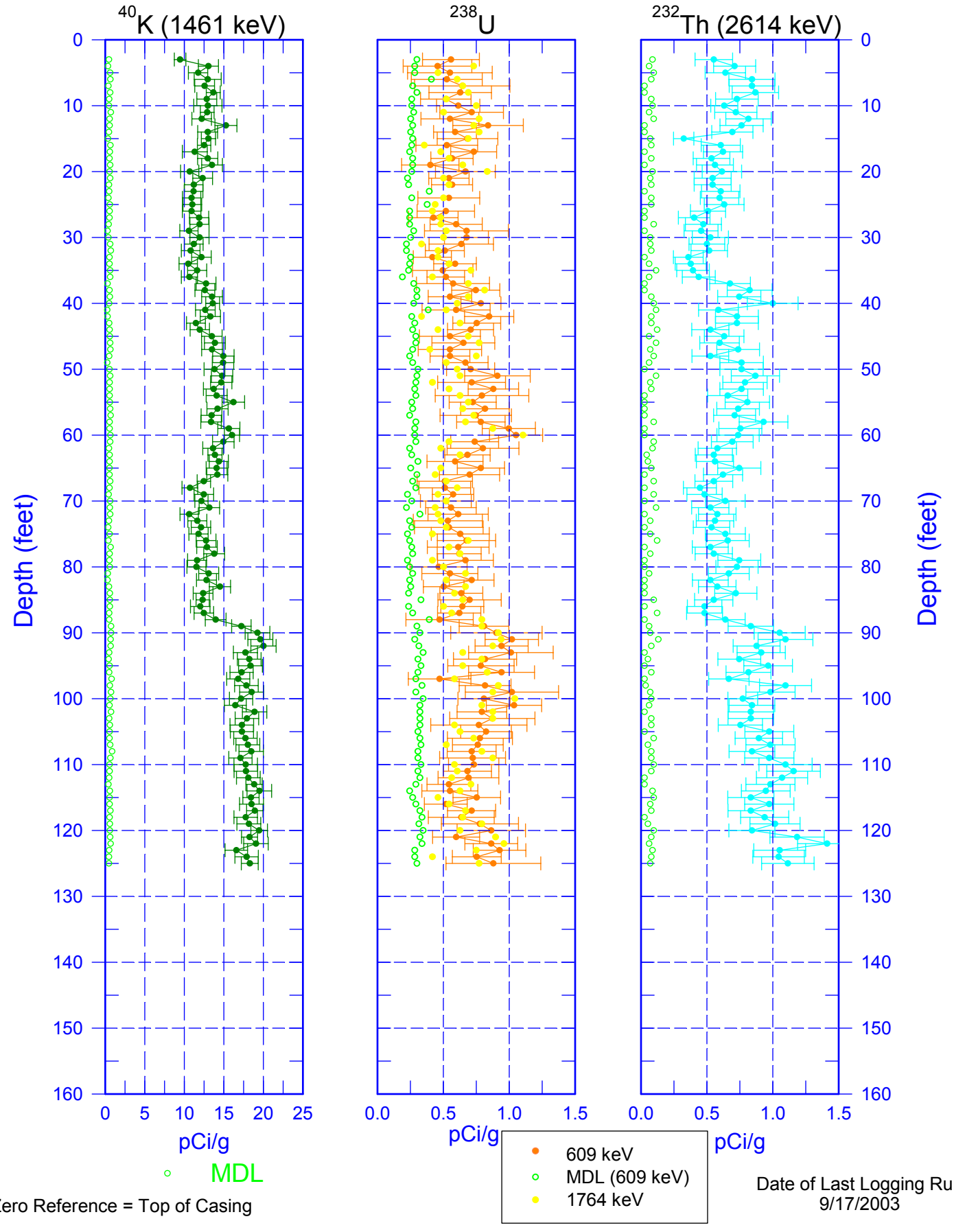
299-W18-20 (A5471)
Man-Made Radionuclides



Zero Reference = Top of Casing

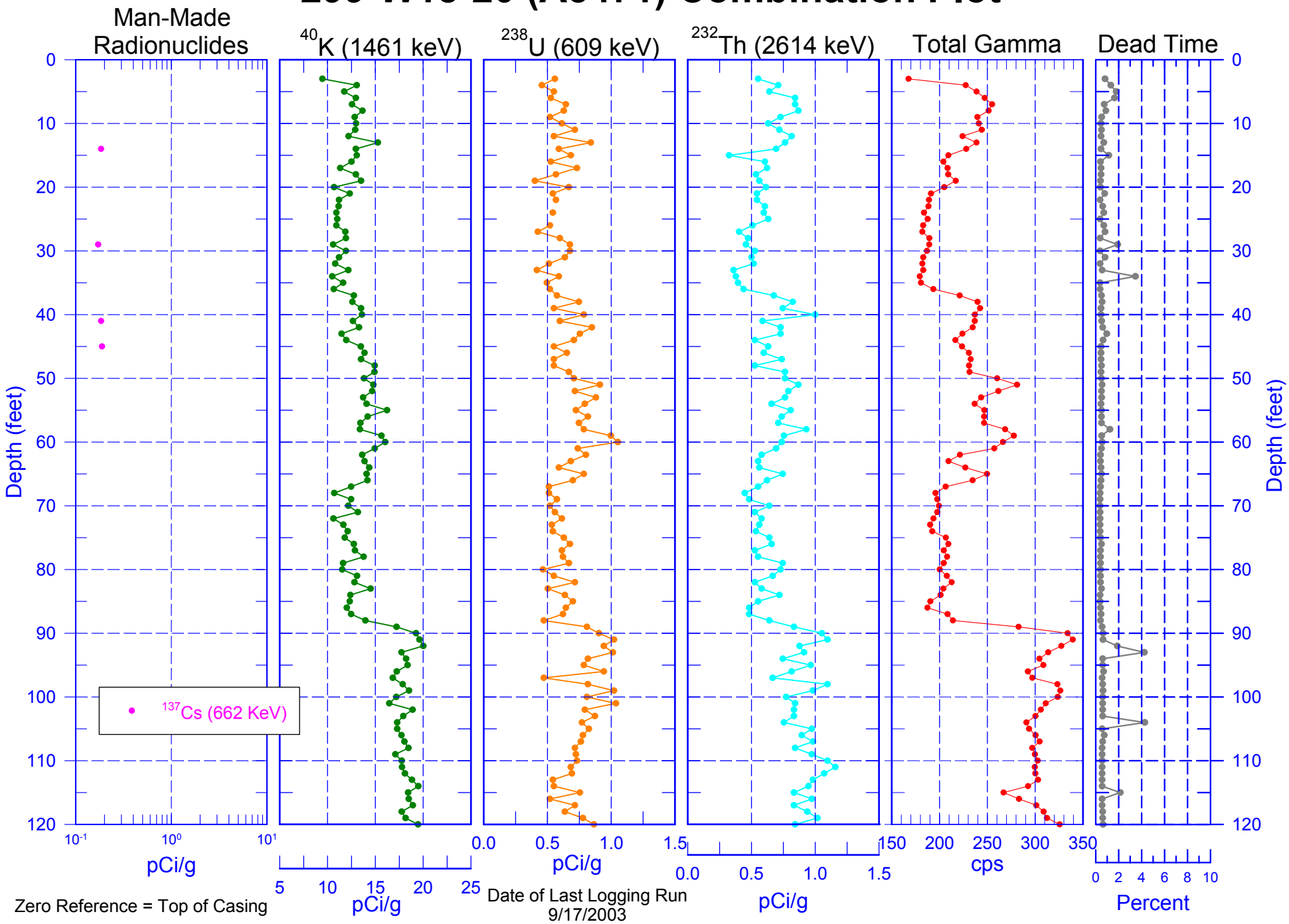
Date of Last Logging Run
9/17/2003

299-W18-20 (A5471)
Natural Gamma Logs

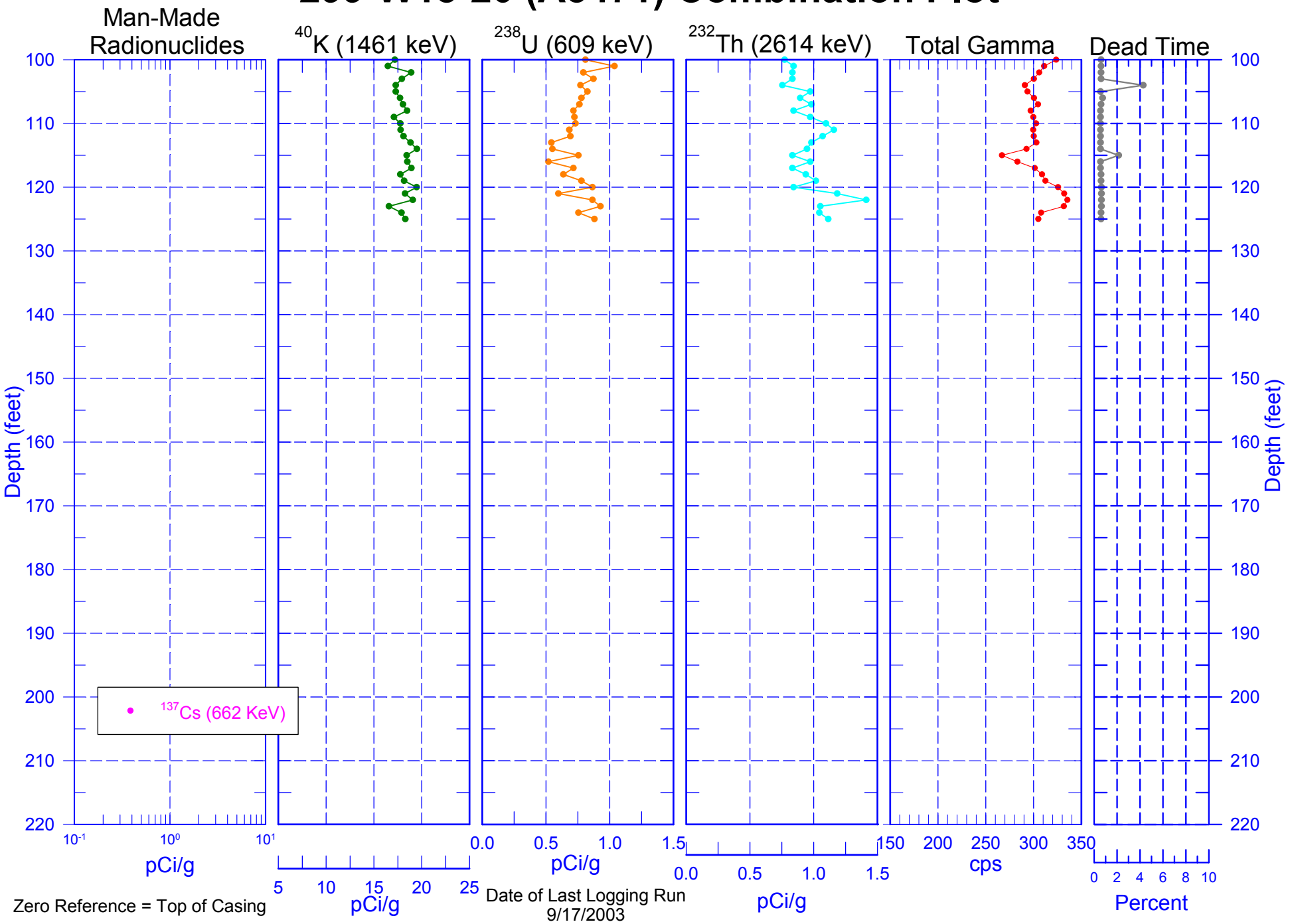


Zero Reference = Top of Casing

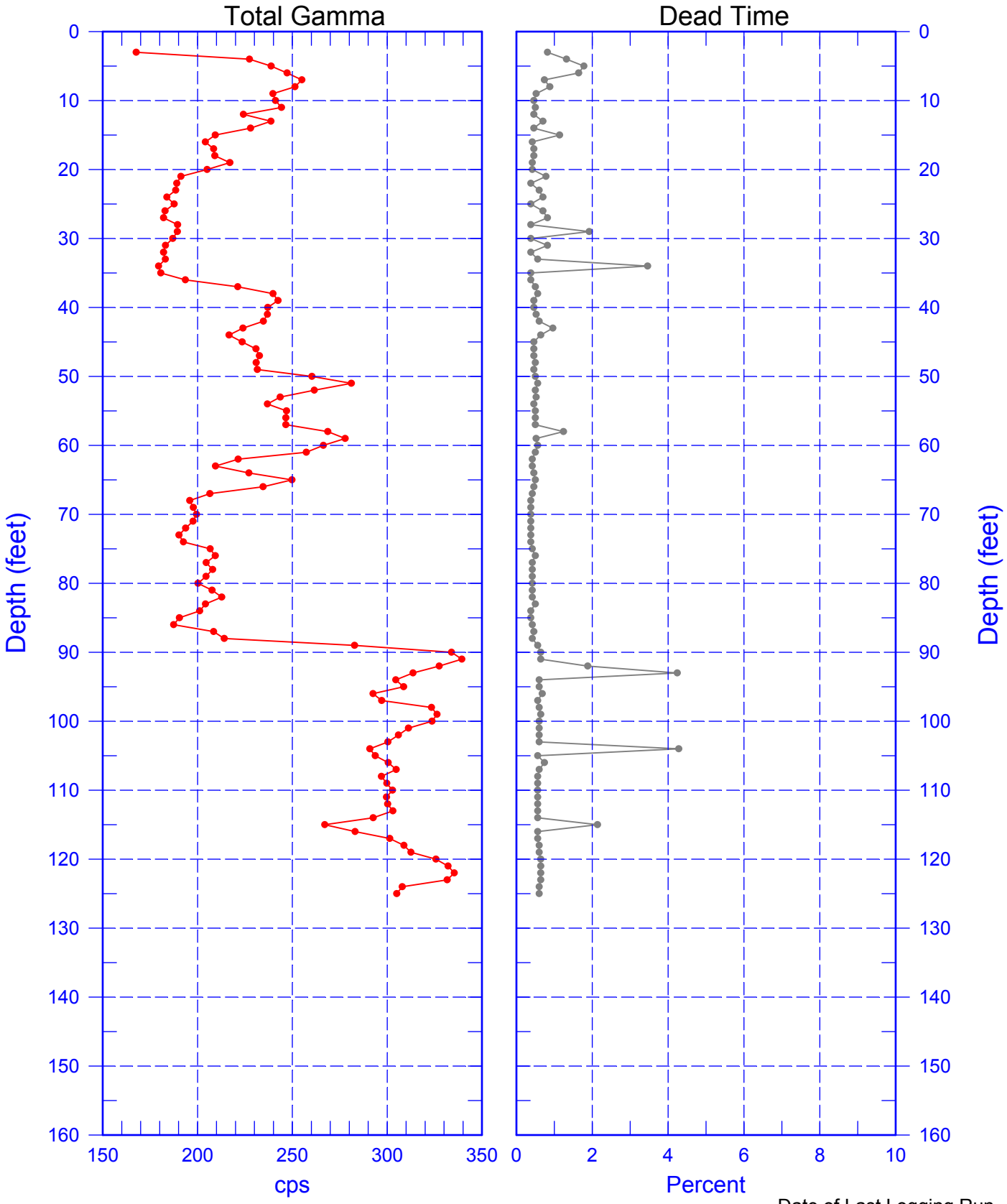
Date of Last Logging Run
9/17/2003


299-W18-20 (A5471) Combination Plot
Man-Made Radionuclides
40K (1461 keV)
238U (609 keV)
232Th (2614 keV)
Total Gamma
Dead Time
Depth (feet)
137Cs (662 KeV)
pCi/g
pCi/g
pCi/g
pCi/g
cps
Percent
Zero Reference = Top of Casing
Date of Last Logging Run
9/17/2003

299-W18-20 (A5471) Combination Plot



299-W18-20 (A5471)
Total Gamma & Dead Time

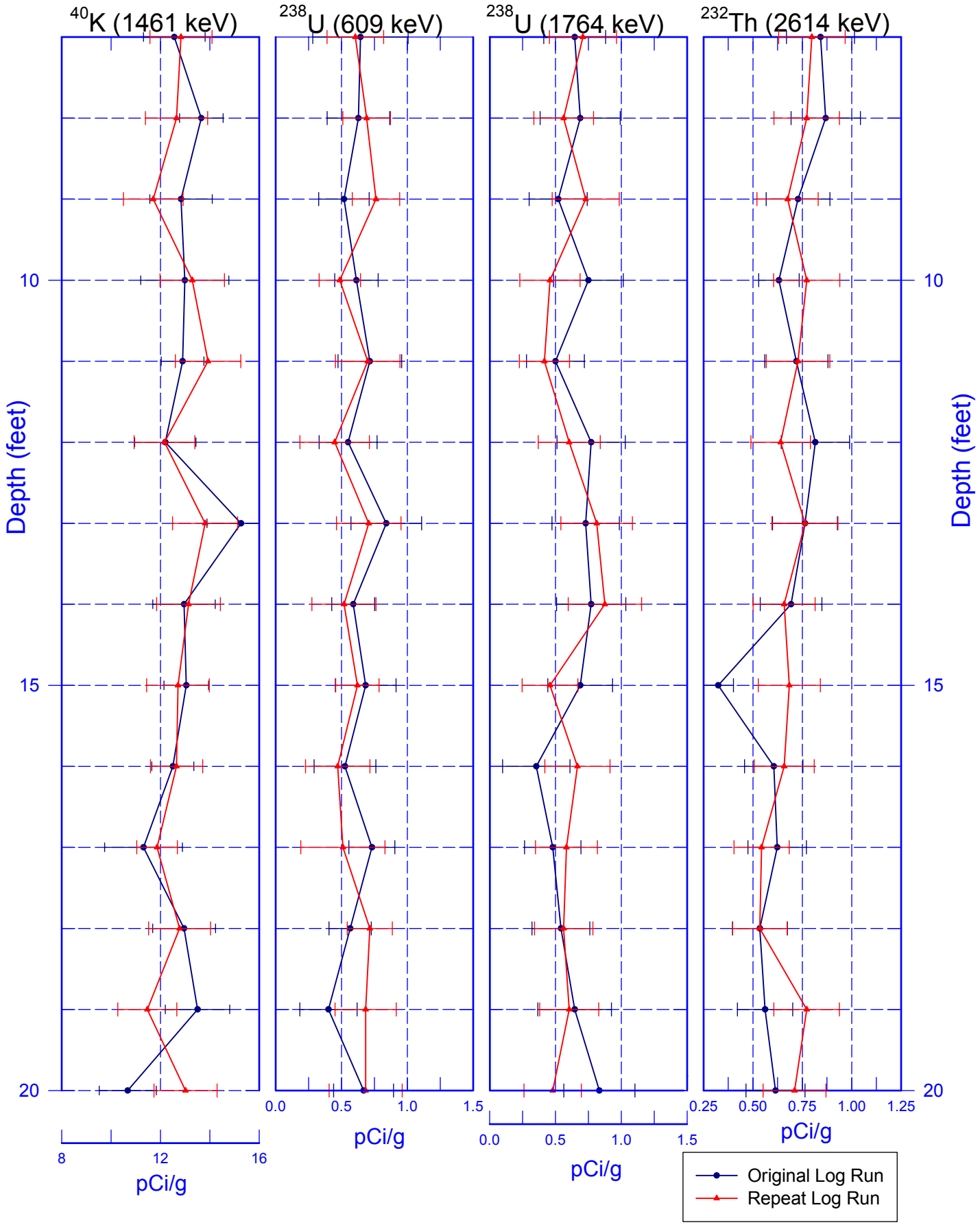


Date of Last Logging Run
9/17/2003

Zero Reference = Top of Casing

299-W18-20 (A5471)

Rerun of Natural Gamma Logs (20.0 to 7.0 ft)



299-W18-20 (A5471)

Rerun of Man-Made Radionuclides (20.0 to 7.0 ft)